What is claimed is:

1. A method of analyzing test data obtained from an aeroelastic structure, the method comprising:

reading a plurality of data points, each data point representing a motion at a location on the aeroelastic structure;

performing a closed form fit to the plurality of data points to obtain an initial curve fit condition; and

performing at least one non-linear transfer function frequency response curve fit to the plurality of data points.

2. The method of Claim 1, wherein the aeroelastic structure comprises an aircraft surface, and wherein reading a plurality of data points includes reading a plurality of data points, each data point representing a motion at a location as a function of frequency.

3. The method of Claim 1, wherein reading a plurality of data points includes reading a plurality of flutter test data points.

4. The method of Claim 1, wherein performing at least one non-linear optimization curve fit to the plurality of data points includes iteratively performing a plurality of non-linear optimization curve fits to the plurality of data points until a convergence criterion is satisfied.

5. The method of Claim 1, wherein performing at least one non-linear optimization curve fit to the plurality of data points includes performing at least one non-linear optimization curve fit to the plurality of data points using a Jacobian matrix populated using analytically-derived sensitivities.

6. The method of Claim 5, wherein the Jacobian matrix is populated using analytically-derived sensitivities that are computed directly from the plurality of data points.

7. The method of Claim 5, wherein performing at least one non-linear optimization curve fit to the plurality of data points includes performing at least one non-linear optimization curve fit to the plurality of data points using a Jacobian matrix populated using analytically-derived sensitivities based on a State Space Model.

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8. The method of Claim 5, wherein performing at least one non-linear optimization curve fit to the plurality of data points includes performing at least one non-linear optimization curve fit to the plurality of data points using a Jacobian matrix populated using analytically-derived sensitivities based on a Pole Zero Model.

9. The method of Claim 1, further comprising assessing an adequacy of the non-linear optimization curve fit.

10. The method of Claim 1, wherein performing at least one non-linear optimization curve fit to the plurality of data points includes determining a number of modes to include in the at least one non-linear optimization curve fit to the plurality of data points.

11. The method of Claim 1, further comprising transforming the plurality of data points into a State Space Model.

12. The method of Claim 1, further comprising transforming the plurality of data points into a plurality of Pole Zero Models.

13. A method of analyzing test data obtained from an aeroelastic structure, the method comprising:

reading a plurality of data points, each data point representing a motion at a location on the aeroelastic structure;

performing a linear transfer function frequency response curve fit to the plurality of data points to obtain an initial curve fit condition; and

performing at least one non-linear transfer function frequency response curve fit to the plurality of data points.

14. The method of Claim 13, wherein reading a plurality of data points includes reading a plurality of flutter test data points.

15. The method of Claim 13, wherein performing at least one non-linear optimization curve fit to the plurality of data points includes performing at least one non-linear optimization curve fit to the plurality of data points using a Jacobian matrix populated using analytically-derived sensitivities.

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16. The method of Claim 13, wherein performing at least one non-linear optimization curve fit to the plurality of data points includes performing at least one non-linear optimization curve fit to the plurality of data points using a Jacobian matrix populated using analytically-derived sensitivities based on a State Space Model.

17. The method of Claim 13, wherein performing at least one non-linear optimization curve fit to the plurality of data points includes performing at least one non-linear optimization curve fit to the plurality of data points using a Jacobian matrix populated using analytically-derived sensitivities based on a Pole Zero Model.

18. The method of Claim 13, further comprising assessing an adequacy of the non-linear optimization curve fit.

19. A computer program product for analyzing test data, the computer program product comprising:

a first computer program portion configured to read a plurality of data points, each data point representing a motion at a location;

a second computer program portion configured to perform a closed form fit to the plurality of data points to obtain an initial curve fit condition; and

a third computer program portion configured to perform at least one non-linear transfer function frequency response curve fit to the plurality of data points.

20. The computer program product of Claim 19, wherein plurality of flutter test data points are acquired using a plurality of sensors.

21. The computer program product of Claim 19, wherein the first computer program portion is further configured to read a plurality of flutter test data points acquired using a plurality of sensors.

22. The computer program product of Claim 19, wherein the third computer program portion is further configured to perform at least one non-linear optimization curve fit to the plurality of data points using a Jacobian matrix populated using analytically-derived sensitivities.

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23. The computer program product of Claim 19, wherein the third computer program portion is further configured to perform at least one non-linear optimization curve fit to the plurality of data points using a Jacobian matrix populated using analytically-derived sensitivities that are computed directly from the plurality of data points.

24. The computer program product of Claim 19, wherein the third computer program portion is further configured to perform at least one non-linear optimization curve fit to the plurality of data points using a Jacobian matrix populated using analytically-derived sensitivities based on a State Space Model.

25. The computer program product of Claim 19, wherein the third computer program portion is further configured to perform at least one non-linear optimization curve fit to the plurality of data points using a Jacobian matrix populated using analytically-derived sensitivities based on a Pole Zero Model.

26. The computer program product of Claim 19, further including a fourth computer program portion configured to assess an adequacy of the non-linear optimization curve fit.

27. The computer program product of Claim 19, wherein the third computer program portion is further configured to determine a number of modes to include in the at least one non-linear optimization curve fit to the plurality of data points.

28. The computer program product of Claim 19, wherein further including a fourth computer program portion configured to transform the plurality of data points into a State Space Model.

29. The computer program product of Claim 19, wherein further including a fourth computer program portion configured to transform the plurality of data points into a Pole Zero Model.

30. A system for analyzing flutter test data, comprising:
a control component;
an input/output devise coupled to receive a plurality of data points; and
a processor arranged to analyze the plurality of data points, the processor including:

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a first component configured to read the plurality of data points, each data point representing a value at a location;

a second component configured to perform a closed form fit to the plurality of data points to obtain an initial curve fit condition; and

a third component configured to perform at least one non-linear transfer function frequency response curve fit to the plurality of data points.

31. The system of Claim 30, wherein the input/output devise is coupled to received a plurality of data points, the plurality of data points including a plurality of flutter test data points.

32. The system of Claim 30, wherein the third component is further configured to perform at least one non-linear optimization curve fit to the plurality of data points using a Jacobian matrix populated using analytically-derived sensitivities.

33. The system of Claim 30, wherein the third component is further configured to perform at least one non-linear optimization curve fit to the plurality of data points using a Jacobian matrix populated using analytically-derived sensitivities that are computed directly from the plurality of data points.

34. The system of Claim 30, wherein the third component is further configured to perform at least one non-linear optimization curve fit to the plurality of data points using a Jacobian matrix populated using analytically-derived sensitivities based on a State Space Model.

35. The system of Claim 30, wherein the third component is further configured to perform at least one non-linear optimization curve fit to the plurality of data points using a Jacobian matrix populated using analytically-derived sensitivities based on a Pole Zero Model.

36. The system of Claim 30, wherein the processor includes a fourth component configured to assess an adequacy of the non-linear optimization curve fit.

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37. The system of Claim 30, wherein at least one of the first, second, and third components is further configured to determine a number of modes to include in the at least one non-linear optimization curve fit to the plurality of data points.

38. The system of Claim 30, wherein the processor includes a fourth component configured to transform the plurality of data points into a State Space Model.

39. The system of Claim 30, wherein the processor includes a fourth component configured to transform the plurality of data points into a Pole Zero Model.

40. The system of Claim 30, wherein the input/output devise is coupled to received a plurality of data points, the plurality of data points including a first plurality of test data points from a first test sensor, and a second plurality of test data points from a second test sensor.

41. The system of Claim 30, further including a memory component operatively coupled to at least one of the control component, the input/output device, and the processor.

42. The system of Claim 30, further including a data acquisition component operatively coupled to at least one of the control component, the input/output device, and the processor.

43. The system of Claim 42, wherein the data acquisition component includes a plurality of data acquisition sensors.

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